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OF THE

ELEVENTH ROCKY MOUNTAIN CONFERENCE

OF ENTOMOLOGISTS

PINGREE PARK, COLORADO

August 12 to 17, 1934

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Report of the Eleventh Rocky Mountain Conference of Entomologists,
Pingree Park, Colorado, August 12 to 17,
inclusive, 1934

Edited by Geo. M. List, Secretary

The Colorado Agricultural College Forestry lodge and bunk house was again made the headquarters. This year the crowd went to the Park from Fort Collins on Sunday instead of Monday as in the past. The change seemed to meet the approval of the visitors judging from their early arrival Saturday afternoon and evening and their anxiety to get to the Park Sunday morning. Many of these driving their own cars had been to the Park before so there was less delay than usual in getting started. All were on their way by 9 a.m. and to the camp for lunch.

The following is a list of those in attendance:

Drake, Carl J.	Ames, Iowa
Kelly, E. G.	Manhattan, Kansas
Kelly, Mrs. E. G.	Manhattan, Kansas
Kelly, Edward	Manhattan, Kansas
Sabrosky, Curtis W.	Manhattan, Kansas
Smith, Roger C. & family	Manhattan, Kansas
Harman, Mary T.	Manhattan, Kansas
Riley, Wm. A.	St. Paul, Minn.
Riley, Alice L.	St. Paul, Minn.
Stoddart, Genevieve	St. Paul, Minn.
Whitehead, F. E.	Stillwater, Okla.
Pritchard, A. E.	Stillwater, Okla.
Hixson, Ephriam	Stillwater, Okla.
Eyer, E. R. & family	State College, N. Mex.
Lindquist, A. W.	Uvalde, Texas
Brown, F. M.	Colo. Springs, Colo.
Brown, Mrs. F. M.	Colo. Springs, Colo.
Hicks, Chas. H.	Boulder, Colo.
James, Maurice T.	Boulder, Colo.
James, Helen B.	Boulder, Colo.
Newton, J. H.	Paonia, Colo.
Milzer, Albert	Denver, Colo.
Davis, Eleanor A.	Fort Collins, Colo.
Lacey, Frances	Fort Collins, Colo.
Thompson, Mrs.	Fort Collins, Colo.
Casper, Jean	Fort Collins, Colo.
Shanks, Kenneth	Fort Collins, Colo.
Hoerner, J. L.	Fort Collins, Colo.
Portman, R. W.	Fort Collins, Colo.
Hoerner, Edna B.	Fort Collins, Colo.
Palmer, M. A.	Fort Collins, Colo.
Bjurman, Carl A.	Fort Collins, Colo.
List, George M.	Fort Collins, Colo.
Jones, Laura M.	Fort Collins, Colo.
Jones, Chas. R.	Fort Collins, Colo.

Gillette, C. P.	Fort Collins, Colo.
Richmond, R. G.	Fort Collins, Colo.
Daniels, Leslie B.	Fort Collins, Colo.
Davis, Louis G.	Fort Collins, Colo.

Sunday afternoon was taken in issuing bedding, preparing the camp and in doing the many little things necessary to make a crowd comfortable in a mountain lodge.

In the absence of the Chairman, C. P. Gillette, who on account of other arrangements could not get to the Park until Monday, the first meeting was called to order by the Vice-chairman Roger C. Smith, at 8 p. m. Sunday evening.

Since the minutes of the previous meeting had been published in a mimeograph form their reading was dispensed with. Announcements were made in regard to hours for meals, a few camp rules relating to fishing in the streams and lakes, making fires in the forest, etc.

The following committees were appointed: Program, Wm. A. Riley, E. G. Kelly, Geo. M. List; Entertainment, Mrs. E. G. Kelly, Mrs. C. R. Jones, Mrs. J. L. Hoerner; Sports, J. L. Hoerner, Mary T. Harman, Charles H. Hicks; Resolutions, F. E. Whitehead, C. J. Drake, C. W. Sabrosky; Nominations, C. R. Jones, C. J. Drake, R. C. Smith.

No papers were given at this meeting, the remainder of the evening being given to getting acquainted, "sink the ship" etc.

Monday, August 13, 1:30 p.m.: F. E. Whitehead presiding

Grasshopper Work in Kansas, E. G. Kelly, Extension Entomologist, Kansas State College of Agriculture and Applied Science. Kansas experiences considerable damage to crops by grasshoppers almost every year. In order to keep them under control, it is necessary to practice cultural methods and to apply poison bran mash every year.

In the late fall of 1930 and early spring of 1931; many of the farmers tilled their land to destroy the eggs, and also scattered a good supply of poison bran mash during 1931 to destroy the young hoppers. The good response to control practices in 1931 reduced the damage and also the grasshoppers very materially. So much so, that there was little indication of grasshopper damage in the spring of 1932. Lack of money in 1932 caused the farmers to

neglect the practice of scattering poison bran mash, and during the fall, the fall-sown wheat was damaged somewhat at the edges of the fields. The grasshoppers were plentiful in some localities in the western part of the state, and scattering infestations in the eastern part. The farmers felt that the low market price of wheat and corn and other crops did not warrant the use of poison bran mash. The county commissioners had little or no money in the county treasury to use in purchasing grasshopper bait, and therefore little bait was scattered.

In the late fall of 1933, the damage to fall-sown wheat was quite serious in the western localities and indications were that Kansas might expect some real serious trouble in 1934. The grasshopper eggs were plentiful in the spring of 1934, and later the young hoppers were more than plentiful.

Kansas has a law which allows the county to organize for the control of grasshoppers and petition the county commissioners to purchase materials for making poison bran mash. To combat the infestation in 1934, we arranged for a series of district conferences with county agricultural agents and Farm Bureau leaders in early April for the purpose of setting up an organization to poison the grasshoppers and make such petition. In the meantime Congress appropriated funds for grasshopper control and in response to the request for federal assistance in this work in Kansas, material was furnished Kansas farmers. The organization was then set up in this series of district meetings to handle the poison and bran.

There were 621 leaders out of 37 counties attending the district meetings. Later, local meetings were held in the counties by these leaders to demonstrate the mixing and applying of the poison mash. Reports show that 4,610 farmers attended these local meetings. Many of the farmers have been well trained in previous years in this control practice and therefore did not need the demonstration meeting.

The regular Kansas formula for grasshopper bait consists of 20 pounds of wheat bran, one pound white arsenic and 2 quarts of molasses (a few of the counties purchased and used oranges or amy1 acetate) which weighed 5 pounds, and 3 gallons of water which weighed 24 pounds. That amount made 50 pounds of bait.

The 50,000 pounds of white arsenic and 1,000,000 pounds of bran, molasses and water, made 2,500,000 pounds of mash which was scattered over 150,000 to 200,000 acres. Most of this bran was scattered at the edges of fields where the hoppers were hatching in the early spring so as to get them before they entered the fields. In that way, the mash protected a larger number of acres of crops from serious damage.

E. G. K.

The 1934 Grasshopper Campaign in Iowa, C. J. Drake, Iowa State College.- The grasshopper infestation was limited to the western part of the state, being heaviest in Woodbury County along the Missouri River. Over 260 tons of poisoned bran mash were used in the campaign. The species concerned were Melanoplus mexicanus, M. bivittatus and M. differentialis. The species are named in the order of importance. On the whole the infestation was quite spotted and confined largely to the uplands. Considerable migration of adult grasshoppers from Nebraska and South Dakota was noted in the fall of 1933 and late summer of 1934.

C.J.D.

The Grasshopper Control Campaign in Colorado, Kenneth W. Shanks, Assistant State Leader, Fort Collins.- When Colorado entered the grasshopper control program for 1934, a state board was set up consisting of Mr. F. A. Anderson, Director of Extension, Dr. Geo. M. List, Experiment Station and State Entomologist, and Sam C. McCampbell, Extension Entomologist. Mr. McCampbell acted as State Leader, and the services of one Assistant State Leader were used.

Colorado received 1800 tons of Federal bran that was sub-allotted to 40 counties out of a total of 63 Colorado counties, the major portion of the bran going to the counties east of the Continental Divide. The mountainous counties had no great need for hopper bait.

Each county set up one or more central mixing stations, and the farmers called for the wet bait paying only the costs of mixing, sacks, molasses or amyl acetate, if these ingredients were used. In some of the counties relief labor was used for the mixing.

We used the regular Colorado formula, in practically all the plants, as follows:

Bran.....	100 pounds
Sodium arsenite.....	2 quarts (4 lb. to a gal.)
Amyl acetate.....	3 ounces
Beet molasses.....	2 gallons
Water.....	10 to 12 gallons

Where molasses was not available only amyl acetate was used with good results. A few counties used only bran, arsenic and water with fair results.

Lincoln County experienced a heavy outbreak of Dissostera longipennis and approximately 120 tons of bran were used in controlling this species. The agent of this county estimated that about 80 percent of the hoppers were killed.

There were a few reports of live-stock and poultry

poisoning, but in every case, it was the result of carelessness on the part of the person spreading and handling the bait. Game birds were not poisoned in any section.

At the end of the season 400 tons of bran were in storage. This was the result of the drought burning up the crops and, therefore, the farmers stopped poisoning. This bran will be used on the hatching grounds early next spring.

K.W.S.

In the discussion that followed Dr. Drake expressed the opinion that a late adult survey would be more valuable in determining the prospects for another season's population than an egg survey.

Roger Smith and List told of experiences with oil baits. The initial kill is not as high as with wet baits, but the final kill may be almost as good. The oil baits cannot be scattered as rapidly by hand as the wet ones.

Notes on the Black Widow Spider, Albert Milzer,
University of Colorado.- The black widow (Latrodectus mactans Fabricius) is a coal-black spider marked with red or yellow or both. Though the markings may vary, the most constant and distinguishing mark is the hour-glass one on the ventral aspect of the abdomen. A full-grown female measures about one-half inch in length, and a full-grown male measures one-fourth inch in length. The poison glands of this spider are situated in the cephalothorax, and according to Marx, the poison gland of a matured female averages from 2 mm. to 2.5 mm. in length and .37 mm. to .50 mm. in width. The poison gland of the matured male is on the average .99 mm. long and .17 mm. at its greatest width.

Nearly everywhere that this species occurs it is greatly feared by the inhabitants because of its venomous bite. It has been given many popular names, such as the "hourglass" spider, the "shoe-button" spider, the "T-bar" spider, and the "po-ko-moo." Merriam (1910) writes that the term "po-ko-moo" was applied to this species by certain tribes of the California Indians, who would crush the spider and use its body fluids to poison their arrows.

During the past four years, I have taken many specimens of black widows around Boulder under rocks and in basements and garages of nearly all sections of the city of Denver. In spite of the many reports during this past summer regarding the great numbers of black widows observed both in Colorado and surrounding states, I don't regard the black widow spider population on any very marked increase. It is my opinion that these spiders have invaded the basements and garages of this and surrounding states in order to escape the drouth and obtain more moisture.

Baerg (1923) described the results of an induced bite of a female black widow on the inner surface of the basal joint

of the third finger. Though he suffered considerable pain, was compelled to spend a day in bed, and had medical attention, yet the effects were not marked. He records that frequent hot baths and the keeping of the bitten hand in hot water, were most effective in reducing the pain and restlessness.

Bogen (1926) reviews the reported cases due to the bites of this spider. He records some 150 cases from the United States and Canada. Fully two-thirds of them are from California and most of the victims were males who were bitten on the penis or adjacent parts while sitting on outdoor privies. He reports 12 deaths. He also records fifteen cases at the Los Angeles General Hospital. All were males ranging from two to sixty-five years of age. Ten were bitten on the penis. The symptoms were acute pain, localized and general, profuse perspiration, restlessness, nausea, vomiting, labored breathing, board-like rigidity of the abdomen, and constipation.

Other species of the genus *Latrodectus* occur in various parts of the world, especially in the tropics, and are generally regarded as dangerous. Thus *L. karakurt* occurs in Russia, *L. malmigniatus* in Spain, and *L. Scelio* in New Zealand.

A.M.

Monday, August 13, 7:30 p.m. C. J. Drake, presiding.

The Aphids and the Evolution Theory, C. P. Gillette, Colorado Agricultural College. - C. P. Gillette gave an illustrated address on "The Aphids and the Evolution Theory." He stated that evolution must account for the coming into being of all organisms or fail as a theory. The aphids, though small, weak and non-resistant towards predators, fulfill every fundamental principle involved in the Darwinian theory. Their overproduction and rapid succession of generations are phenomenal, giving opportunity for the most rigid selection, and the survival of those best fitted to cope with the many destructive agencies that beset their lives. The Aphids possess very highly specialized organs and instincts and a succession of forms within the species that are transmitted to offspring with as little variation as are the characters in the so-called, higher forms of life.

Hemerobiidae of the Pingree Park Region, Roger C. Smith, Kansas State College, Manhattan, Kansas. - The following species of Hemerobiidae have been taken in 4 visits to the Pingree Park region of Colorado, and are in the writer's collection. Most of them were collected by beating pines and spruce trees. These forms, both as adults and larvae, feed upon the Lachnids which infest Englemann spruce. Two larvae were taken by beating the trees, but both were injured in the collecting. The period of collection was generally the third week in August. A few specimens

were also collected on the screen around the porch of the lodge. The species known to occur, with brief descriptions of them, follow:

1. Sympherobius angustus Banks
A small, dark species, length 6 mm. Scarce.
2. Boriomyia longifrons Walker
A large, broad-winged species, 11 mm. long. Mesonotum yellow. Scarce.
3. Boriomyia disjuncta Banks
As above, but wing color darker, distinctly brown or blackish-brown. Mesonotum not prominently yellow. The most plentiful species of this genus at Pingree Park.
4. Boriomyia brunnea Banks
A rare, large, broad-winged species with veins unmarked and membrane light brownish; length, 9 mm.
5. Hemerobius bistrigatus Banks
A light reddish-brown species with distinct spots on the front wings; the most common Neuropteron at Pingree; length 7-10 mm. I have perhaps 100 specimens.
6. Hemerobius venustus Banks
A beautiful species, the spots largely forming two lines across the front wing; length 7 mm. Scarce.
7. Hemerobius cockerelli Banks
A very rare, very dark winged species; length 7 mm.
8. Hemerobius nevadensis Banks
A light winged species with indistinct brownish cloudings for spots; length 7 mm.
9. Hemerobius albipestris Banks
Medium light species with spotted veins; rare; length 7 mm.

These nine species of Hemerobiids do not include the specimens taken during the meeting of 1934. There may be one or more additional species in the group of about 90 collected then.

The other families of Neuroptera are represented by a specimen of Raphidian taken by Dr. C. J. Drake by beating willow, four specimens of Coniopterygidae beating pines, and one specimen of Chrysopa plorabunda Fitch taken by beating a spruce about four miles down the mountain from the lodge.

R.C.S.

Tuesday, August 14, 8:30 a.m. C. P. Gillette presiding.
Chinch Bug Control in Iowa, C. J. Drake, Iowa State

College, Ames, Iowa.- Approximately 3,000,000 gallons of creosote and coal tar were used in 1934. This material was purchased largely by the federal government. The farmers in the state purchased a few hundred thousand gallons.

Over 11,000 miles of creosote-furrow barriers were built in the state and 29,204 farmers constructed barriers.

A new type of barrier - chemically treated paper barrier - was used to a limited extent in several counties. Over 200 miles of paper barriers were constructed in the state in 1934.

In 19 counties approximately 35 percent of the corn was saved from the attack of the first generation of the chinch bugs by barriers. Between 9 and 10 percent of the corn acreage in these 19 counties was destroyed by the first generation of chinch bugs. The loss to small grain in 29 counties varied from 10 to as high as 99 percent of the entire crop. Almost every field of barley was totally destroyed by the bugs in heavily infested areas. Forty-two counties used creosote in chinch bug warfare in 1934. The State Department of Agriculture cooperated with the Experiment Station and Extension Service in the work.

C.J.D.

Tuesday, August 14, 1:30 p.m. C. P. Gillette presiding.

Colorado Wild Flower Slides, Helen B. James, Boulder, Colorado.

Further Observations on Factors Influencing Codling Moth Bait and Light Trap Attractancy, John R. Eyer, State College, New Mexico.- During the past 7 years investigations have been in progress at the New Mexico Agricultural Experiment Station to determine the value of various aromatic baits and illuminating devices in the control program for the Codling Moth. As a result of these studies a slowly fermenting bait of cane syrup and sodium benzocate has been developed to capture the adults under conditions of high temperatures and frequent precipitation. Also illuminated traps equipped with electrified grids have proved of additional assistance in capturing and retaining the moths. Studies of the chemistry of fermenting syrup baits indicated that their attractiveness was apparently due to aromatic esters evolved during the process of fermentation and gas formation. Moreover, certain commercially manufactured esters approached syrup baits in attractiveness, notably isobutyl phenyl acetate, ethyl oxhydrate and geranyl formate. These esters are aromatic monobasic acids or their derivatives and altho resembling the aroma of apple blossoms or fruit have little close similarity in chemical composition. Altho the exact nature of the inherent attractive principle of these baits is still unknown, it has been possible, however, to show by statistical analysis, the significance of these baits in

comparison with such chance external factors as position in the tree, exposure to light, wind currents, and related factors. It has been demonstrated during the past two seasons' investigations along these lines that the composition of both the fermenting syrup and ester baits has a significance of 2-16 times that of the other factors. Moreover, when the bait or light traps are given western, or slightly southwestern, or northwestern conditions in individual trees or plots, which under New Mexico conditions, involve greater exposure to prevailing westernly winds and sunset light intensity, higher catches are secured. With respect to the general chemotropic and phototropic responses of the insect, the investigations in New Mexico have indicated that the major nocturnal activities of the moths occur at two distinct periods; namely, a flight period around sundown when 60-70 percent of the moths are active, and a second period at sunrise when 15-20 percent are in flight. Also moth activity normally occurs at light intensities of approximately 30-50 foot candles, and artificial lights producing these ranges of intensities prolong the flight periods and consequently the nocturnal visitations to attrahent baits when the traps are under in conjunction. Nocturnal temperatures above 80 degrees F. as well as those below 60 degrees F., inhibit moth flight and hence decrease their responsiveness to both baits and lights. Lastly, it has been observed that irrespective of whether the attrahent is a bait, a light, or a combination of the two, the sex ratio was approximately equal, altho usually more males than females have been captured, the ratio being approximately 55 percent males to 45 percent females.

J.R.E.

Codling Moth Spray Experiences of 1933, for Paonia, Colorado, J. H. Newton, Deputy State Entomologist. The standard spraying schedule consisted of the calyx spray and four cover sprays of lead arsenate (2.5 pounds to 100 gallons).

The spray experiment consisted of sizeable plots of Rome Beauty or Delicious. The standard schedule was taken as the basis against which all other comparisons were made.

The addition of lime to the lead arsenate spray, which reacted with the casein in the spray to form a lime-caseinate spreader improved the control for the Rome Beauty, but gave less control for the Delicious.

A special lead arsenate gave equal control for the Rome-Beauty and showed some improved control for the Delicious.

The standard spray schedule of lead arsenate gave like control in the case of both varieties.

The substitution of four cover sprays of zinc arsenite for lead arsenate failed to control for either variety.

The substitution of four cover sprays of special zinc arsenite gave satisfactory control for the Rome Beauty but failed in the case of the Delicious.

Four cover sprays of zinc arsenite substituted for lead arsenate gave very disappointing results.

Four cover sprays of calcium arsenate gave satisfactory control for the Rome Beauty but failed very materially to protect the Delicious.

Four cover sprays of Kalo (sodium fluoaluminate) gave satisfactory control on the Delicious.

Six cover sprays of lead arsenate in place of the usual four cover sprays gave very marked improvement of control as evident by the decrease in wormy fruit and total injured fruit.

Five cover sprays of lead arsenate improved the control over four.

J.H.N.

The Robber Flies of Oklahoma, A. E. Pritchard, Oklahoma A & M College, Stillwater, Okla. - The number of species of robber flies found in Oklahoma is surpassed only by Texas. The robber flies in the eastern part of the State are typical of the asilid fauna of eastern United States; while the central prairie region, along with its characteristic species, is a transition zone to the semi-western species found in the western part of the state. The region of the Cimarron River at the extreme end of the panhandle, is purely Western. Different species are found under a variety of conditions, and local distribution is common.

The eggs are elongate, whitish, and are laid in bunches with a frothy adhesive. When laid on grass stems they resemble the egg masses of horse flies. More often, however, they are concealed in crevices of the bark, under the sheaths or in the spike of dead grass, or in the ground. The larvae are elongate, cylindrical, and are white or yellowish in color. They are predacious and are found in the ground or in dead logs and stumps as sub-woodborers. Brown, horny pupal cast skins may be found protruding from the ground or dead logs. At most only one generation is known a year, but some species have several.

The adults are usually predacious in habits, even feeding on each other. The piercing type mouth parts of the larger species are often brought forcibly to the attention of collectors who are not careful in handling them. Many species seem to have preferences for food, and nearly all attack only insects in flight. Mimicry of such insects as bumble bees and hornets is often found.

A preliminary survey of the robber flies of Oklahoma shows one hundred and forty-six species. Many of these are new or have been described in the last few years.

A.E.P.

Notes on the Boll Weevil, Ephriam Hixson, Oklahoma A & M College, Stillwater, Oklahoma.- The boll weevil came into Oklahoma in 1905, but failed to do serious damage until 1921, when it destroyed 41 percent of the crop. In 1927 the damage was 31 percent and 1932, 14 percent. These three years are comparable as to rainfall and abundance of the weevil.

In the earlier years, cold winters kept the population small, however, the coldest winter of the period, 1929-30, failed to kill them. Hot dry summers in the past have kept the weevil out of the western cotton belt and prevented injury in the entire cotton belt. This has not been true in 1933 and 1934, the latter being the hottest, and driest year of record. Weevils are present in large numbers and doing much damage to bolls. From 5 to 27 percent of the bolls are infested.

The boll weevil has adapted itself to both the cold winters and hot, dry summers of Oklahoma, and is a permanent farm problem in the cotton section.

E.H.

Tuesday, August 14, 7:30 p.m.

China as She Appears to a Zoologist, Wm. A. Riley, University of Minnesota, St. Paul, Minn.

Wednesday, August 15.

Wednesday was taken as the recreation day instead of Thursday as has been the custom. Each person was given a box lunch so they could stay out all day if they desired. One small group under the guidance of Frank Koenig who lives in the Park made a horseback trip to Hallets Glacier. Others went to Stormy Peaks, The Cirque, fishing, and on collecting trips.

In the evening Mrs. Maurice James showed a number of motion picture films of unusual interest. These films had been sent by Mrs. T. D. A. Cockerell of Boulder, Colorado. Mrs. Cockerell had expected to be present but found it impossible so was good enough to send the films by Mrs. James. The following films were shown: The Florissant Fossil Deposits, The Bumble Bee, Nature's Handiwork and The Swallow-tail Butterfly.

The Florissant Fossil Deposits*, F. Martin Brown, Colorado Biological Survey.—Probably the best known and most worked of the recent fossil deposits of insects occurs at Florissant, Colorado, to the west of Pikes Peak. The deposits date from Miocene times and are quite extensive. They were formed in a small lake at the side of an active volcano. During the period of deposit the climate was at least subtropical and possibly tropical. Although a very small area has been worked more insect fossils have come from Florissant than from any other such deposit. The entire bed is probably well over 20 feet thick and is alternately fertile and sterile. Although practically all of the modern orders of insects are represented Diptera, Hymenoptera and Coleoptera are predominant. No extinct orders are found and many modern genera are present. Dr. Samuel Hubbard Scudder worked the deposits in the '70's and Dr. T. D. A. Cockerell has been the recent student of the locality. As yet no comprehensive manual has been compiled.

*An ex Temp. introduction to some of Dr. Cockerell's slides shown by Mrs. Maurice James.

F.M.B.

Thursday, August 16, 8:15 a.m. Wm. A. Riley presiding.

Random Notes on the Chloropidae, Curtis W. Sabrosky, Kansas State College, Manhattan, Kansas.—The Chloropidae are Dipterous flies of the Acalyptrate Muscidae, which are very common as a rule in sweepings from grasses and small grains. The family characters, size of the family and the larval and adult habits were briefly reviewed, together with comments on the general taxonomic situation in the family.

With respect to the Colorado fauna 31 species and five varieties are known from the state, either recorded in the literature or identified by the speaker. Fourteen species have been described from Colorado as the type locality, though two of these are now in synonymy.

C.W.S.

Colorado's Method of Apiary Inspection, R. G. Richmond, Office of State Entomologist, Agricultural Experiment Station, Fort Collins, Colo.—Colorado Apiary Inspection has been recently organized under three distinct efforts, spring scouting, rapid summer inspection of commercial apiaries and summer inspection of small lots of bees.

Spring scouting starts in January or February. The purpose is to discover if winter dead colonies are diseased and to destroy them if so. The purpose is to prevent spread of disease by robbing. Theoretically, this should be done by owners, practically, it is not.

Rapid summer inspection of commercial apiaries is carried on during the two weeks previous and following the start of the main honey flow. This work is accomplished in a short space of time by the owners furnishing four helpers to the inspector. The work, well organized, may proceed, under this plan, at the rate of 500 to 700 colonies per day.

Following the inspection of commercial apiaries, the county inspector is free to devote his time to the small lots, which apparently form the greatest hazard despite their dis-proportionate numbers.

R.G.R.

Notes on an Outbreak of Midges, Culicoides variipennis Coq.
Family Chironamidae, Order Diptera, F. E. Whitehead, A & M College, Stillwater, Okla. - During August of 1934 an out-break of a species of blood sucking midge developed in the northern part of Pottawatomie County along the north Canadian River between the towns of Harrah and Shawnee. The species was identified as Culicoides variipennis Coq. The activities of the midge began shortly before sunset, at which time they appeared in large swarms around houses, barn lots and fields, throughout the infested territory. They were so numerous in these swarms that literally thousands of them could be collected with a single sweep of the insect net. The hum of their wings produced a sharp high pitched tone that could be very distinctly heard at almost any point in this vicinity. In looking toward the setting sun, there were many places where they were so thick that it gave the appearance of a cloud of dust raised by a car in driving rapidly over a dusty road, and in at least a few instances were mistaken for such dust clouds. In the earlier part of the evening they seemed to pay but little attention to stock, the most of their activities being connected with swarming, which probably was a part of their mating activities.

As darkness approached their swarming activities decreased and they began dropping from the swarms to attack livestock and to a less extent people who were out at this time. The favored feeding places on the stock seemed to be the usual places of attack for flies, or any portion of the body where they were the least subject to being dislodged. On cows they were especially bad around and on the udder and teats, along the belly, base of ears and horns, back of neck and base of tail, where they gathered in large spots, many of which contained hundreds of midges. Such attacks continued throughout the night resulting in large sore spots, sore and bloody teats and extreme restlessness of the animals attacked. Other livestock were attacked in a similar manner.

It was found that the breeding of the midges was confined almost exclusively to the North Canadian River. At all points of the river in the vicinity, the water was teeming with countless millions of larvae, and an almost solid line of pupae was floating along either bank. The larvae could most readily be seen by scraping lightly the silt on the bottom of the river in shallow water. Following such

a procedure it seemed that the area scraped was covered with a wriggling mass of tiny larvae. Although the most of the larvae were concentrated on the bottom, they were very numerous higher in the water also.

The peculiar condition resulting in such an outbreak seems best explained as follows: The river in this vicinity was exceedingly foul due to the fact that the sewage from Oklahoma City is dumped into the river above, and on account of the drought the river had been very low for several weeks. As a result conditions were very unfavorable for the predaceous forms, normally living in such places, that usually feed heavily on such animals as midge larvae and pupa. Also it seemed that the larvae fed upon the filth. The fact that none of the midge could be found in the river above the point where the sewage was dumped substantiates such an argument.

It was noticed that stock that went into barns before becoming heavily infested with midges remained comparatively free from them. It was therefore recommended that stock be driven into barns or sheds about sundown as a protective measure. A number of the farmers tried this plan and reported varying degrees of success. The success probably varied according to the promptness with which the stock were put inside, and according to the openness of the barn or shed, but relief was reported in every case. It is thought that a definite rise in the river will terminate the outbreak.

(Later note). A heavy rain fell the night of August 21 resulting in quite high water in the river. The infestation began dwindling at once, and within two weeks had practically disappeared.

F.E.W.

Aphid Classification for General Entomologists and Laymen, Miriam A. Palmer, Agricultural Experiment Station, Ft. Collins, Colo.- A plan was presented for suggestions and criticisms on a scheme of characters whereby aphids could be classified as far as possible by means of characters observable with the naked eye or with the hand lens and reinforced by microscopic characters. A tentative key was presented for aphids on fruit trees and currants and gooseberries. The following characters were used as far as possible in the order given:

For field observation.- with the naked eye: host plant, location and effect on host plant, presence of cottony secretion, color of aphids; with hand lens: color of appendages and markings on body, size and relative lengths of body and antennae, tibiae, cornicles, cauda and hind tarsi. Microscopic characters: size of frontal tubercles, presence and number of secondary sensoria on antennae, shape of cornicles and character of hairs.

Descriptions of individual species contain the foregoing characters followed by a life history account.

M. A. P.

Thursday, August 16, 1:30 p.m. J. R. Eyer presiding.

Progress Report on the Work on Alfalfa Insects, Roger C. Smith, Kansas State College, Manhattan, Kansas.- Work on experiment station project No. 115 which is entitled "Insects Affecting Alfalfa, Clover and Grasses" was begun in 1917. It was enlarged in 1930 to include the grasses because of the special interest of Professor Wilbur in this phase of the project. During the past year, observations have been made on the following insects:

1. The webworms, of which there are 3 species in alfalfa; viz., the garden webworm, Loxostege similalis; the beet webworm, L. sticticalis, and the so-called alfalfa webworm, L. commixtalis. There was a widespread outbreak of the beet webworm during 1934 in Kansas, when a large population of larvae developed on Russian thistle and to a lesser extent on beets and alfalfa. The alfalfa webworm appears to be building up in numbers in Kansas.

2. Two crown feeders - Nomophila noctuella and Acrolophus spp. Both make tubes in the soil around the base of the clumps, the second being the more numerous this year.

3. Grasshoppers.- A summary of published information on the locust fungus was prepared and published. Two series of sowings of the oil mash in comparison with wet mash were made during 1934. Good results were obtained with both formulae. The largest initial kills were made with the water mash, but the ultimate kills of the two were within the range of normal variation. Oil mash possesses some definite advantages and disadvantages. The results are not regarded as conclusive because of abnormal weather conditions.

4. The pea aphid.- A large outbreak during March and April was brought to a sudden end all over the state by the convergent lady bird beetle, on May 10. Mechanical control efforts were not satisfactory. Definite resistance to the aphid was observed in the Lodak and Turkestan varieties. Certain plants of Kansas common also showed resistance. This important characteristic of some strains of alfalfa will be investigated cooperatively by Dr. R. H. Painter and representatives of the Department of Agronomy, Bureau of Plant Industry and the Bureau of Entomology.

R.C.S.

The Reproduction System of Grasshoppers, Mary T. Harman, Kansas State College, Manhattan, Kansas.- The female reproductive system comprises the ovaries, oviducts, vagina, spermatheca, and spermathecal gland. No collectorial glands are present. The ovaries are paired and each is composed of about eighteen ovarian tubules terminating in a cup-shaped modification of the oviduct--the egg calyx. The epithelial lining of the oviduct is glandular. The spermatheca, a bladder-shaped sac situated dorsal to and between the two ovaries, opens into the vagina near the exterior and is filled with spermatozoa

after copulation. Spermatozoa have not been found in any other part of the female. Dorsal to the spermatheca and lying against it is the spermathecal gland. It is connected with the spermatheca by an elongate spermathecal duct.

The male reproductive system comprises the testes, vas deferens, accessory glands, and the penis. Each testis is composed of eight to ten cone-shaped follicles, which are composed of a number of cysts so arranged as to appear segmented. All of the cells of each cyst are in approximately the same stage of development. No seminal receptacle is present. Each follicle is connected with the vas deferens by an efferent tube. The paired vas deferens opens into the sac-like intromittant organ or penis. The terminal portion of the penis may be everted, and when everted is conical in shape. At its base is a thin chitinous collar, the margins of which are thickened, forming ridges.

M.T.H.

Aquatic Insects As Hosts of Helminths Affecting Vertebrates,
Wm. A. Riley, Univ. of Minn., St. Paul, Minn.- Insect anatomists early discovered that the tissues of their subjects might harbor various encysted worms, but it was not until after the middle of the 19th. century that it was realized that these worms were immature stages of parasites maturing in animals which fed on these insect hosts.

Most frequently are certain species of flukes transmitted by aquatic insects. A review of the life cycle of a typical fluke makes evident the reason for this. Eggs discharged by the worm in its definite host pass out and those which reach the water produce a free-swimming embryo which enters its appropriate species of snail. In the snail it passes through a complicated polyembryonic development and there finally emerge a large number of cercariae.

Contrary to the conception of most students, these do not necessarily encyst on grass as they are told those of the sheep liver fluke do. Some enter crustaceans, others fish, or frogs or tadpoles and the like. It is now known that numerous species enter insect larvae, which serve as "transport hosts." As such are known immature forms of Odonata, Ephemeraida, Plecoptera, Neuroptera, Trichoptera, Lepidoptera, and Coleoptera. Best known are those found in the Odonata. The active Cercaria bores into the body of the immature form but may also persist through the stages of metamorphosis. Thus either nymph, (or larva) or adult may be infective to the predator which serves as a final host.

Very few of those life cycles have been worked out in full. One which has received considerable attention in the past few years has been studied by various students in our laboratories and has served as the subject of a detailed thesis by Ralph Macy. It develops in a particular species of snail and then enters with the

currents of water into the rectum of various dragonfly naids, particularly those of *Tetragoneuria*. Boring through the delicate lamellae of the rectal gills the cercariae become enclosed in characteristic cysts, visible to the naked eye on dissection. When the emerging naids or the adult dragonflies are eaten by ducks, turkeys, chickens or a number of other species of birds, the young flukes excyst, and soon pass down the intestine to enter the oviducts.

Here they give rise to serious pathological conditions. In hens under observation and in those experimentally fed there was almost complete cessation of egg laying. In some instances the effects were so severe as to cause death of the fowl. In Minnesota, with its "10 thousand lakes," this infection is a cause of heavy losses to farmers and poultrymen who allow their chickens access to the lake shores at a time when theordes of naids are emerging.

This is merely one illustration. Few fluke life histories involving insects have been worked out but the field offers many interesting and important problems.

W.A.R.

Notes on a Revision of Odontomyia, Maurice T. James, University of Colorado, Boulder, Colorado.- In the author's revision of *Odontomyia*, material has been examined from almost every state in the United States and every province of Canada. Forty species are listed, seven of them new to science. The genus is divided into groups, the grouping being based largely on characters that have been little used previously. The characters of most use in the classification of this genus are: (1) antennal structure; (2) wing venation; (3) pilosity; (4) male genitalia; and (5) color pattern.

M.T.J.

Thursday, August 16, 7:30 p.m. R. C. Smith presiding.

Further Observation on the Pathological Histology and Pytochemistry of Psyllid Yellows, John R. Eyer, State College, New Mexico.- This paper described the entrance of the feeding stylets of the potato nymph into the border parenchyma and vascular bundles of the leaf, the destruction of cells during entrance and at the feeding objective, e.g. the border parenchyma cells, and the accompanying deposits of starch in abnormal quantities in the mesophyll of the leaf and the cortex and pit of the stem. Cytological investigations resulted in failure to demonstrate any abnormal cell inclusions such as x-bodies which are frequently observed in mosaic diseases or any necrosis of the phloem as for potato leaf roll and similar diseases. A critical study of the chloroplasts revealed indications of disintegration, especially near the feeding punctures and in leaf tissues showing marked disease symptoms where they seem to be smaller and less definitely outlined. Further investigations of the nature of the sheath materials surrounding the stylets through differential staining of histological sections and microchemical tests failed to demonstrate any persistent characteristics such as have been described for the sheath of the potato leafhopper by

Smith and Poos. The sheath disappears soon after the beak is withdrawn. Apparently then "Psyllid Yellows" is not induced, as is "hopper burn," by a blocking of phloem and xylem with a resultant disturbance of translocation and water conduction. The tests thus far indicate that the sheath material is largely of animal rather than plant origin and is of the nature of the xantho proteins or other nucleo proteins containing arginine, tryptophane and possibly tyrosine. Mucin also has been demonstrated. When the course traversed by the beak is intercellular, the pectic materials of the plant cell wall are apparently destroyed as it enters. Preliminary chemical analyses of the carbohydrates in diseased as compared with healthy plants consistently show higher percentages of starch, both in leaf and stem samples. Also a different ratio in the hexoses and sucrose exists. In so far as conclusions are possible from the investigations at present, "Psyllid Yellows" appears to be a chlorotic toxemia induced by the injection of undetermined toxins probably proteinaceous in character and the extracting of sucrose and hexoses, resulting in an unbalancing of the carbohydrate metabolism of the growing plant.

CARBOHYDRATE RELATIONSHIPS IN PSYLLID YELLOWS
OF POTATO

Starch

Nature of Material	% starch Polariscope Method	% starch Reduction Method	Average
Healthy Leaf Samples Series I	3.46	3.43	3.45
Diseased Leaf Samples Series I	6.58	6.05	6.32
Healthy Leaf Samples Series II	2.42	2.18	2.30
Diseased Leaf Samples Series II	13.17	6.60	9.89

Sugars

	% Hexoses (as Invert Sugar)	% Sucrose	Total % Invert Sugar	S/H Ratio
Healthy Leaf Samples	0.98	0.11	1.08	1-9
Diseased Leaf Samples	0.068	0.009	0.069	1-7

J.R.E.

The Yampa Canyon Slides, F. Martin Brown, Colorado Biological Survey.- The Yampa Canyon of the Bear River in the northwestern part of the state of Colorado is one of the last places in the United States to be explored by scientists. The Penrose-Taylor expedition of the Colorado Biological Survey made a reconnaissance of the area in the summer of 1933. The bottom of the canyon presents many Lower Sonoran characteristics. The river can be approached at only five points in the 58 miles of its course. A great pinon pine forest containing many trees over 300 years in age grows on a bench about half way down into the canyon. One of the outstanding finds of the expedition was the evidence of a prehistoric culture related to the Freemont Basket-Makers of south central Utah. There is a movement a foot and favorably looked upon by the Department of Interior to preserve that area as it stands today as a national Monument. There are great possibilities for further study in all of the biological fields and in Archeology.

F.M.B.

Notes on a Cactus Bee, Lithurgus apicalis Cresson, Charles H. Hicks, University of Colorado, Boulder, Colo.- Certain of the bees of the genus Lithurgus apparently confine their pollen collecting to the cactus flowers, according to Professor T.D.A. Cockerell. The species Lithurgus apicalis has been found and reported by Professor C. P. Gillette to sometimes do much damage by digging into and nesting in telephone poles. The bees have been reared from old cottonwood stumps by the writer. Some sixty cocoons were secured in 1926 at Base Line Lake near Boulder. The tunnels and cells were close together in a small area. Many gave evidence of having been used year after year, the main shafts especially having been used a number of times. Partitions of chewed wood separated the thin paper-like, light brown cocoons one from another. The larvae were very white and remained inactive when removed from their cocoons. The bees matured in test tubes in the laboratory where they were kept at slightly above room temperature. No parasites emerged from the 1926 lot, but in 1933 a large percentage of flies, Anthrax irrorata Say, were reared from the cells of this bee which had been taken from near Owens Lake. Some 225 cocoons were found in a small portion of an old exposed stump where the tunnels and cells honeycombed a limited area. When the wood becomes too soft the nests are abandoned as was shown from material secured at White Rocks in 1934. Also during the past season, specimens of this bee were found nesting in a stump near a main street in downtown Boulder.

C.H.H.

Friday, August 17, 8:00 a.m. C. P. Gillette presiding.
Business session.

At a session earlier in the week there was some informal discussion on the advisability of approaching the American Association of Economic Entomologist in regard to forming a Rocky Mountain section from the present Rocky Mountain Conference. After

thinking it over the general opinion was that nothing should be done at this time at least. The principal advantage would be in the possible printing of papers, but it was felt that this might not be certain. Many disadvantages could be seen, the principal ones being that such an arrangement would probably get us away from the strictly informal meeting and might discourage the attendance of systematists and others not interested in the purely economic. As one visitor stated "it would make it just another entomological meeting and destroy the uniqueness that makes us want to come back."

The following report of the resolution committee was read and approved:

Résolved that:-

1. The Eleventh Annual Rocky Mountain Conference of Entomologists wishes to express its appreciation to the Colorado State Board of Agriculture and the Department of Forestry for placing at its facility the buildings, grounds and equipment of the College of Forestry Lodge at Pingree Park, which are so admirably fitted for the requirements of this conference.

2. We further tender our heartiest thanks to the members of the Department of Entomology of the Colorado State Agricultural College, and especially to Doctors Gillette, List and Jones, for arranging the details of this conference and for their hospitality which resulted in making this meeting both profitable and enjoyable.

3. Whereas, the members of this conference have expressed their unanimous and hearty approval of the "Aphid Classification for General Entomologists and Laymen", proposed by Miss M. A. Palmer for the Aphids of Colorado, be it resolved that this Conference officially express its approval of this project which we believe will be of invaluable assistance to systematic and economic entomologists and to others interested in learning to recognize the species of this economically important group, and request that as far as it is practical, it be extended to include the aphids of the Rocky Mountain region.

F. E. Whitehead
C. J. Drake
C. W. Sabrosky

Suggestions were asked for in regard to making the meetings more enjoyable and valuable. Considerable discussion followed. Mrs. Maurice James was elected as the permanent chairman of the entertainment committee and asked to have mimeographed a few popular songs for use. Those from out of Colorado were asked to send to the Secretary or to Mrs. James, state, college, or other songs that will be especially appropriate.

The following officers were elected for 1935:

C. P. Gillette, Chairman
C. L. Fluke, Vice-chairman
Geo. M. List, Secretary
C. R. Jones, Treasurer

.From the Collecting Net

Extreme drouth in the forests made it necessary to caution people about carelessness with fire.

The temperature was above normal during the week. It was one of the few when frost did not show. Even at that a fire in the big fire place felt good, even to the Kansas people who thought they never would want a fire again.

The streams and lakes were low, which made fishing good in places. J. L. Hoerner and C. R. Jones brought in 137 one day.

The forestry road from the Poudre Canon to the Park was found to be much improved by the work of the CCC workers. Making it over this on high is a big improvement over the old days when we had to get out and push, or back the Model T's up some of the steep places to make them take gas.

C. J. Drake and A. E. Pritchard made a collecting trip through Southern Colorado into New Mexico and Arizona, following the Conference. They reported a wonderful trip.

Collecting was better than usual in the Park. Several reported taking forms that they had not found during previous meetings.

The Kansas-Colorado soft ball game was called off by common consent. It is too strenuous for a 9000 feet altitude.

Minature golf continues to be the most popular sport even when Professor Dean is not present. It more nearly suits our physical abilities under the altitudinal conditions.

We never did decide which was the hottest this summer, Kansas or Oklahoma. It all depended on who you talked to last.

Dr. Riley and family, and Miss Stoddard, reported a very pleasant trip after the Conference, through Wyoming and the Black Hills region. Dr. Riley attended the meetings just ten years ago, but promised not to wait ten this time to return.

The stunts this year took the form of a treasure hunt and such "treasures" as angleworms, grasshoppers, safety pins, crawfish are difficult to find in a hurry in Pingree Park.

Those that went to Hallett's Glacier reported that the ice had receded farther this season than for some time. Many fragments of insects were in the debris found on the ice. Mr. Wellington brought some of this down for examination.

Some fairly well preserved specimens of the old Rocky Mountain Locust, Melanoplus mexicanus, migratory phase spretus(Walsh) were collected under similar conditions from old snow banks in the



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Longs Peak area in the Rocky Mountain National Park. They had, no doubt, been in cold storage a long time.

Mr. and Mrs. E. R. Bliss of Greeley, Colorado, missed the meetings this year for the first time for several years. Their thoughts were with us, judging from the song to the tune of "Oh Dem Golden Slippers," written by Mrs. Bliss from her bed, where she was recovering from an operation. We will have to try this out next year.

Those that have taken the hike to the Cirque, a most beautiful spot at the foot of the Mummy range, will be interested to know that an FERA crew of about 25 men was taken to the Lodge shortly after the Conference, to work on a road from Pingree Park to the Cirque reservoir site, which is west and a little south of Pingree Park, just north of Mummy pass and on the east side of the Mummy range. The College owns the reservoir site and hopes to develop an additional supply of water for land in the Valley. Fish have a way of getting into reservoirs like this.

Mark the week of August 18 to 23, 1935 on your calendar.

Geo. M. List, Secretary